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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/580,097

05/19/2006

Patrick Desmond Cunningham

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EXAMINER

HAILEY, PATRICIA L

ART UNIT

PAPER NUMBER

1793

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PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/580,097	<b>Applicant(s)</b> CUNNINGHAM ET AL.	
	<b>Examiner</b> PATRICIA L. HAILEY	<b>Art Unit</b> 1793	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 24 November 2009.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-21 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-21 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 19 May 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \*    c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |   |   |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)         | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)         | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____   | 6) <input type="checkbox"/> Other: _____                          |

Applicants' remarks, filed on November 24, 2009, have been carefully considered. No claims have been canceled or added; claims 1-21 remain pending in this application.

***Priority***

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Applicants' Priority Document was filed on May 19, 2006.

***Withdrawn Rejection***

The 102(b) rejection of claims 1, 10, 11, and 21 as being anticipated by Li et al. (U. S. Patent No. 5,397,642), stated in the previous Office Action, has been withdrawn in view of Applicants' persuasive remarks traversing this rejection.

***Maintained Rejection***

The following rejection of record has been maintained; the text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

***Claim Rejections - 35 USC § 102***

2. Claims 1-9 and 11-20 stand rejected under 35 U.S.C. 102(e) as being anticipated by Cook et al. (U. S. Patent No. 6,986,943).

Cook et al. teach surface modified particles prepared by the attachment of a small organic compound to the surface of an inorganic particle, followed by attaching additional compounds to the previously attached organic compounds through organic linking groups. See the Abstract of Cook et al., as well as col. 3, line 31 to col. 4, line 24.

The particles may be inorganic nanoparticles having no dimension greater than 200 nm (2000 Å; **claims 9 and 20**), and may have a surface shell comprising aluminum oxyhydroxide, iron oxyhydroxide, scandium oxyhydroxide, a solid solution of aluminum oxyhydroxide and iron oxyhydroxide (**claims 1 and 14**), clay, or mixtures thereof (**claims 2 and 15**). The core of these particles may be identical to or different from the surface shell. See col. 5, lines 10-55 of Cook et al., which also provides the formula for aluminum oxyhydroxide (which reads upon **claim 4**).

In a preferred embodiment, the core and shell are a solid solution of aluminum oxyhydroxide and iron oxyhydroxide (**claims 2, 11, 14, and 15**); see col. 6, lines 27-44 of Cook et al.

Surface modification of the particles involves reactions that form a bond (covalent, ionic, hydrogen, surface adsorption, and dipole-dipole interactions) between the particles and what is disclosed by Cook et al. as “the Anchor of Compound A”. An additional surface modification can be performed, comprising reactions that form a preferably covalent, organic linkage between “Compound B” and a group on the surface-anchored “Compound A”. See col. 6, lines 45-55 of Cook et al. (**claims 3 and 13**).

Compound A is preferably a small molecule containing less than 40 carbon atoms, and comprises at least a reactive anchoring group that reacts with the surface of the particle, and a reactive group (defined as Group 1) that reacts with Compound B. The anchor of Compound A is selected from the group consisting of: a carboxylic acid group, a carboxylate salt, a hydroxyl group, etc. (claims 5, 6, 12, and 16). See col. 7, lines 12-28 of Cook et al.

Group 1 (and subsequent Groups, if additional reactions are performed, see col. 7, lines 1-9 of Cook et al.) is a chemical entity capable of undergoing a reaction and comprises substituents such as those recited in Applicants' claims 5-8, and 17-19. See col. 7, line 45 to col. 8, line 42 of Cook et al.

In view of these teachings, Cook et al. anticipate claims 1-9 and 11-20.

### ***New Ground of Rejection***

The following New Ground(s) of Rejection is (are) being made in view of the newly discovered reference to Diebold; the text of those sections of Title 35, U.S. Code not included in this action can be found in a prior Office action.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

4. *Claims 1-21 are rejected under 35 U.S.C. 102(a) as being anticipated by “The surface science of titanium dioxide,” by Ulrike Diebold (hereinafter “Diebold”).*

Diebold discloses TiO<sub>2</sub>-based systems, wherein metal and metal oxide overlayers on single-crystalline TiO<sub>2</sub> (“metal oxide crystallite particle”, “metal and oxygen moieties”) surfaces are grown. See Table 6 of Diebold, where metals such as V, Nb, Cr, Mo, Mn, Co, Ir, Pd, Ni, etc., and some of their oxides grown on single-crystalline TiO<sub>2</sub> surfaces are depicted.

Diebold also discloses systems in which organic molecules (“inner organic binding group”, “outer organic binding group”; “hydroxyl group”) are attached to the single-crystalline TiO<sub>2</sub> surfaces. See Table 16 of Diebold, as well as pages 171-190.

In view of these teachings, Diebold anticipates claims 1-21.

#### ***Response to Arguments***

In response to Applicants’ arguments traversing the rejection of Applicants’ claims over Cook et al., the Examiner respectfully submits that this reference is considered to continue to anticipate Applicants’ claims in their present form.

Although Cook et al. disclose that the “alumina surface is converted to boehmite and then the boehmite surface layer is modified”, the Examiner respectfully submits that conversion of the alumina particle facilitates modification thereof so that the anchor group can be attached to the particle. It appears that Applicants’ “metal oxide crystallite particles” undergo the same sort of surface conversion (i.e., conversion to

“metal and oxygen moieties”) for attachment of the inner and outer organic binding groups, or at least the inner organic binding group.

Although the *surface* of the alumina particle is converted to boehmite, the entire alumina particle is not converted (i.e., a boehmite particle is not formed).

From viewing the Figures of Cook et al., the “particle” is considered to correspond to Applicants’ “crystallite particle”, “Compound A” is considered to correspond to Applicants’ “inner organic binding group”, and “Compound B” is considered to correspond to Applicants’ “outer organic binding group”.

For these reasons, Applicants’ arguments are not persuasive, and this rejection is maintained.

### ***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to PATRICIA L. HAILEY whose telephone number is (571)272-1369. The examiner can normally be reached on Mondays-Fridays, from 7:00 a.m. to 3:30 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner’s supervisor, Melvin C. Mayes, can be reached on (571) 272-1234. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group 1700 Receptionist, whose telephone number is (571) 272-1700.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/PATRICIA L. HAILEY/  
Primary Examiner, Art Unit 1793  
February 16, 2010